Met Office calls for industry collaboration to minimise impact of complex wind shear on renewable energy production

18 September 2015 - A new investigation by the Met Office reveals that the wind energy industry lacks an in depth understanding of complex wind shear and is calling for future collaboration to aid in mitigating its ill effects on an already stressed sector.

Levelised cost of energy is one of the barriers to future growth faced by the wind industry. This latest whitepaper reveals gaps in knowledge and explains how collaborative action could lead to more accurate energy yield predictions and optimised asset placement, ultimately reducing the levelised cost of energy.

Some surface features and atmospheric effects cause turbulence, eddies and low-level jets, in which moving air changes speed and direction over relatively small distances. As well as causing gusts and wind shifts at the surface, this situation can lead to the phenomenon of faster wind speeds occurring below slower ones. It is this non-standard wind profile with height that is called complex wind shear.

For wind farm operators, complex wind shear can be problematic: making energy production hard to forecast, causing wear and tear on components and making performance difficult to assess. These issues can also be expensive, potentially leading to additional costs via penalties in the 'day-ahead' market, unnecessary use of expensive back-up power by grid-operators, and poor choices around maintenance and replacement of components.

The research that the Met Office is calling for help with will take the form of a systematic study of locations, the causes of wind shear, and involve the modelling of complex profiles. The aim is to develop models to forecast the occurrence of Complex Wind Shear, ahead of individual events, and study its occurrence climatologically. This would allow operators to mitigate against its effects, for example by changing the planned site, hub height or length of turbine blades, or adjust production forecasts and schedule maintenance effectively.

"Knowing how much wind to expect is vital to the renewable wind industry, but this is not the only concern," said Emily Wallace, Met Office research scientist and author of the whitepaper. "Whether estimating return on investment or scheduling maintenance, planners need to consider not just the average speed of the wind but also its variability.

"We have developed this whitepaper to raise awareness of the issue of complex wind shear and its impact on the industry - and in doing so encourage further research to help unlock the true potential of the wind energy sector."

The Met Office is seeking interest from developers, operators and investors who are keen to reduce investment risk and obtain greater generation certainty by sharing their observations, expertise on the impacts of wind shear and case studies of specific wind shear related events.

To receive a copy of the full whitepaper, please visit email renewables@metoffice.gov.uk

The Met Office will be launching its whitepaper at HUSUM Wind 2015 (15th to 18th September, 2015), Germany.

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